SECNAV Energy Training NECC/NECCPAC Overview

25 March 2014

Agenda

- NECC overview
- Expeditionary Energy drivers
- Consumption reduction status and projections
- NECC Energy Strategy
- Potential Materiel Solutions
- Non-Materiel Solutions

Navy Expeditionary Combat Command

Coastal Riverine

Explosive Ordnance Disposal

Naval Construction (Seabees)

Navy Expeditionary Combat Command Mission:

Organize, man, train, equip, and sustain NECC forces to execute combat, combat support and combat service support missions across the spectrum of joint, combined, and multinational operations in green and brown water environments to include confronting irregular challenges in the near-coast, inshore, and riparian environments to include irregular warfare and other shaping missions that secure strategic access from the sea and global freedom of action.

Expeditionary Intelligence

Combat Camera

Expeditionary Logistics

Maritime Civil Affairs & Security Training

Expeditionary Combat Readiness

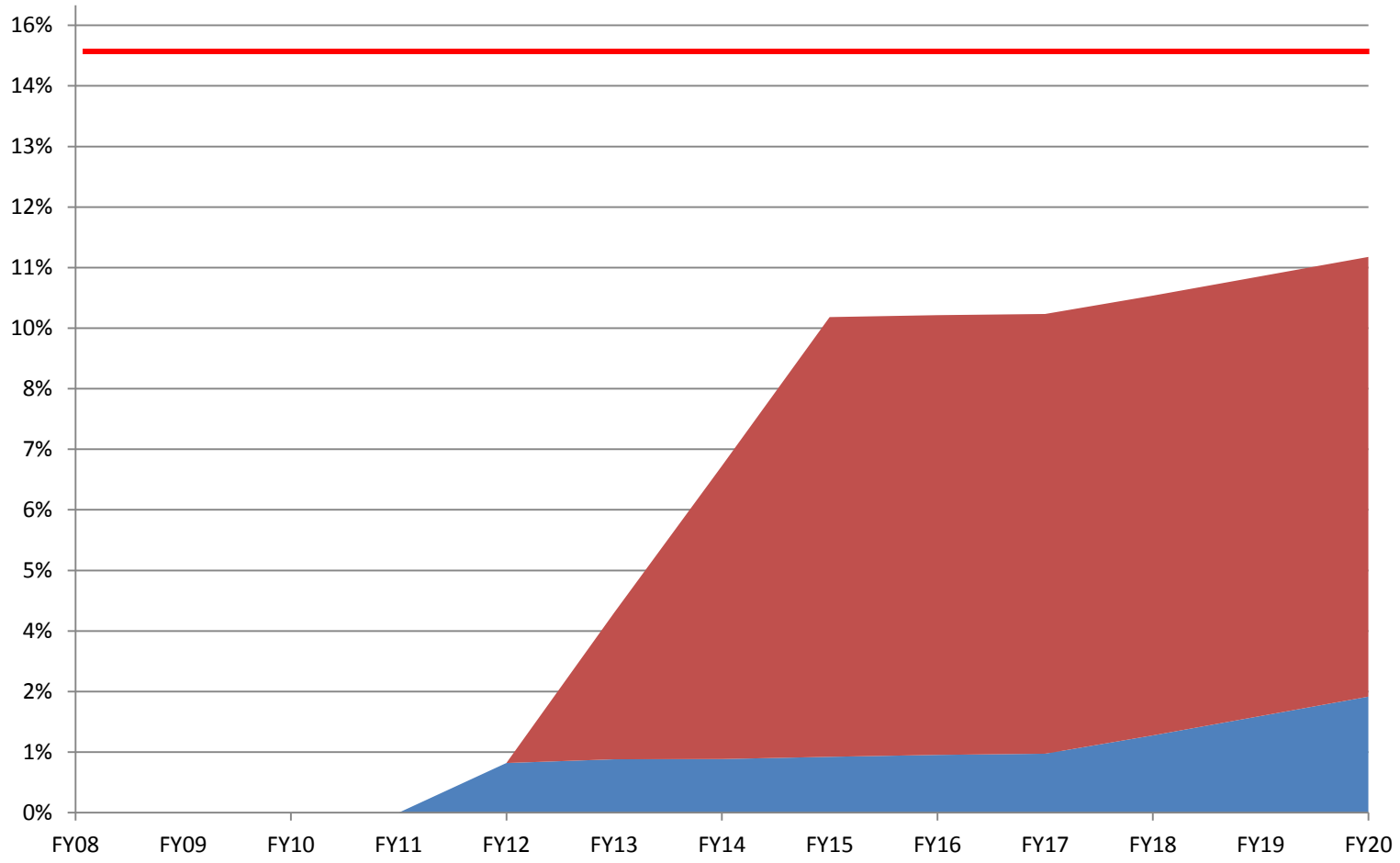
NECC OV-1 Phase 1-5 Operations

Why Expeditionary Energy?

Cost of Fuel

- TRANSCOM estimated that ground convoys in Afghanistan suffered more than 1,100 attacks in 2010 (including IEDs)
- 1 Marine casualty for every 50 fuel/water convoys (2010 Afghanistan)
- USMC – 10% of battlefield casualties in Iraq and Afghanistan are related to convoy operations
- Between 2003 – 2007, 3000 US troop and contractor deaths or injuries were attributed to fuel supply convoys in Iraq and Afghanistan
- As much as 1.4 gallons of fuel can be consumed to deliver 1 gallon of fuel to forces on the battlefield
- Affects weight, speed, range and lethality of U.S. weapon systems
- Fully burdened cost of fuel is $40-$400 per gallon

Consumption Reduction Projections



OPNAV 2020 15% Reduction Goal

Consumption Reduction – Force Reduction

Consumption Reduction – Materiel Solution

NECC Energy Strategy

"Roadmap to deliver NECC operational capability with less reliance on high cost or inefficient energy sources."

- Use of alternative energy sources in expeditionary operations
- Pursuit of equipment efficiency
- Reduction of fuel consumption through changing equipment usage in expeditionary operations

Short range strategy: 2011 - 2015

- Focus on efficiency through modern energy efficient equipment via normal equipment Phase Replacement/Technical Refresh (PR/TR)
- Focus on training and education throughout the force

Mid range strategy: 2016 – 2020

- Focus on Top Fuel consumers
- Encourage and explore development of advanced technologies focused on higher levels of energy efficiency through RDT&E and Acquisition processes

Long range strategy: 2021 – 2025

- Continued focus on Top Fuel consumers
- Further exploration of advanced technologies focused on higher levels of energy efficiency

NECC Top Fuel Consumers

- **Watercraft**
- **Medium sized tactical vehicles – Medium Tactical Vehicle Replacement (MTVR) family**
- **Construction equipment**
- **Generator group**

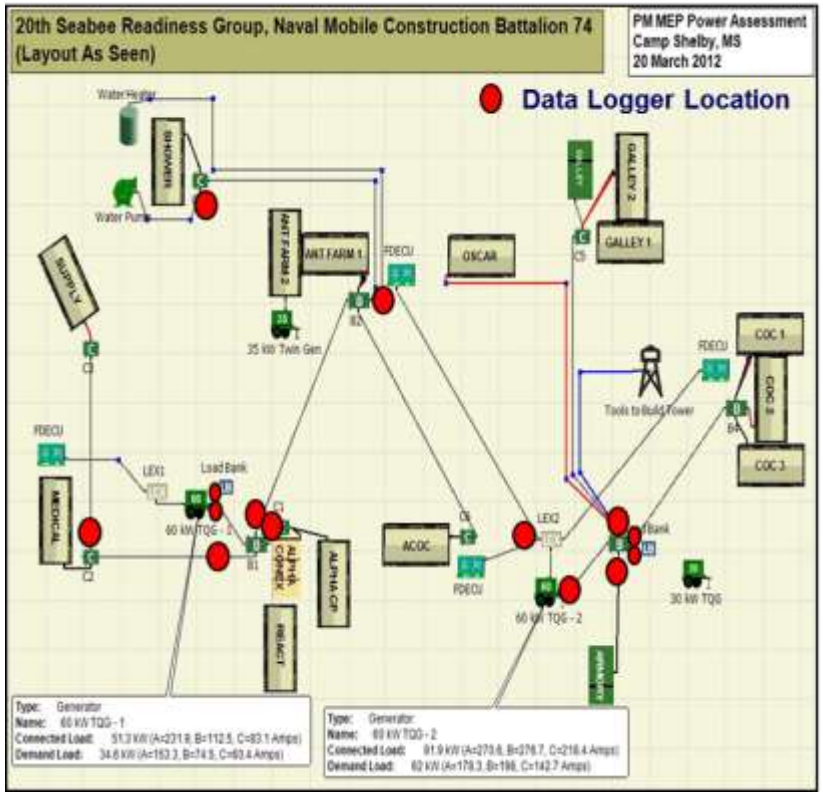
- **Environmental Control Unit (ECU) group**

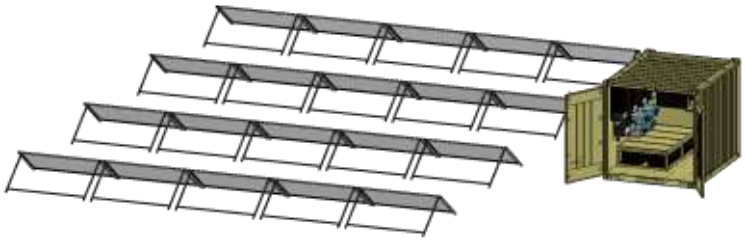
Top Five accounts for over 90% of all fuel consumed throughout NECC

NECC Energy Strategy
Concepts and Precepts

- **Cost effectiveness and commonality of parts, equipment, systems and procedures with USMC and Joint Forces as applicable**
- **SYSCOMs partnering with other services, joint commands, and DoD agencies in support of equipment refresh and modernization efforts**
- **Leveraging and capitalizing on other DoD and commercial initiatives**
  - Lead/follow strategy
  - COTS/GOTS validation and adaptation for NECC use
- **Pursue non-materiel solutions and applications as well as materiel solutions**

Expeditionary Power Integration and Control (EPIC)

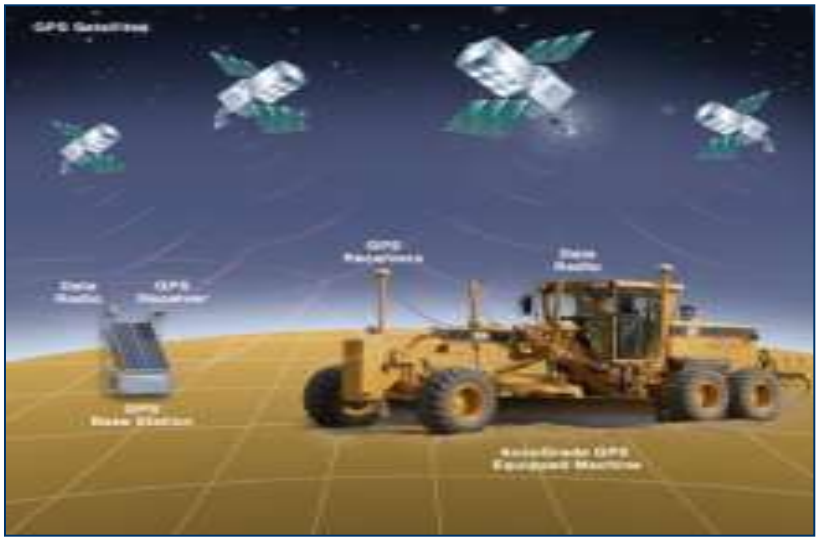


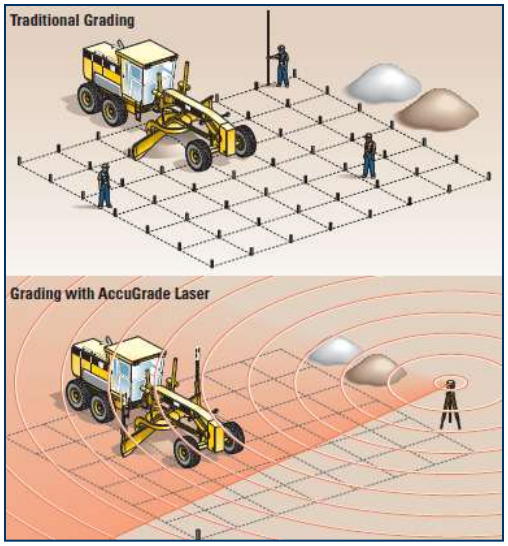


- **SMART Grid technology**
  - Generator output changes with load changes – maximizing generator efficiency
  - Real time communication between load (ECU) and generator source
  - As demand decreases power generation decreases along with fuel consumption
- **Micro Grid technology**
  - Camp supported by primary grid with power supplied by main generators
  - CoC supported by a smaller grid with solar and or small generator for power

Construction Equipment GPS Blade Control Modernization

- Improves earth-moving operational efficiency – manpower and fuel consumption efficiencies
- During testing GPS-assisted dozer reduced total time by as much as 50%, translating to 40% reduction in fuel consumption
- Will provide reduction in fuel cost, manpower and potential risk in non-permissive environments.
- Initial procurements of the blade control systems have been completed with kitting and fielding in progress





Environmental Control Units (ECU)

- **Improved ECU (IECU)**
  - 20% more efficient than current ECUs in TOA

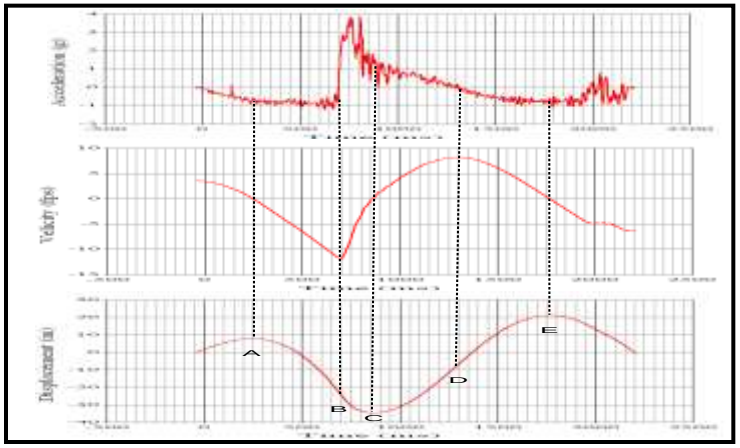
- **Mobile platform containing an integrated Generator and ECU for near term deployment**
  - 20% more efficient than current ECU

Expeditionary Facilities

- **Total camp design for functionality while minimizing fuel consumption demands and burdens.**
- **Tracking market and assessments of technology developments for selective applications in:**
  - Thermally efficient tents/structures
  - Thermal insulation
  - Radiant heat shielding
- **Monitoring and assessing Army Force Provider efforts to transition from soft to hard walled shelters**
  - Improves R-value from R4 to R12
  - Reduces load on ECUs
- **Develop energy kits to include;**
  - LED lighting, motion sensors, and tent liners

Combatant Craft Energy Initiatives

- **Full power demonstration successfully conducted on Riverine Command Boat using 50% algae-based biofuel blend diesel**
- **Data Acquisition Systems installed on boats for metering and monitoring automated fuel consumption and engine performance**
  - Help establish most efficient operational parameters for engine & propulsion systems
  - Inform/influence training and operations to minimize speed extremes when applicable (fast/slow idling, accelerations, crash stops, etc.)
  - Assist in determining optimal maneuvering parameters (wave approach, transitions from brown/green/blue water, etc.)
  - Determining most efficient use of power take offs and ancillary systems (i.e. – A/C)
  - Facilitate preventative and predicative maintenance



Non-Materiel Solutions

Where/How Systems are Used

- **Erection of tents and manner in which ECU ducting is connected**
  - Ensure solid barrier and intake/exhaust placements are precise
- **Placement of generators in camps to minimize driving routes for fuel truck**
- **Boats idling on station for extended periods of time**
- **Convoy idling while waiting for step off**
- **Unnecessary acceleration in vehicles & water craft – operator behavior**
- **Alternate vehicle power profiles**
  - Reprogram Engine Control Unit with fuel efficient power profile - potential 11.8% decrease in fuel consumption)

How the Systems are Maintained

- **Ensuring equipment is clean and in good working order**
  - Minimizes mechanical inefficiencies (ECU ducting, ECU internals, use covers, cabling, PDPs, etc.)
- **Properly reporting and correcting material deficiencies**
- **Condition based vice frequency based maintenance**

It all adds up and every little bit helps!

Conclusion

- Good progress to date but much more to be done!
- Balanced focus on material and non-material solutions
- Continue to leverage Joint solutions and COTS/GOTS applications
- Maintain big picture and keep the long view – enhanced operational capability and mission/materiel readiness are the drivers for what we're doing
- Educate, educate, educate – from the top to the deck plates!
- Communications are paramount – input and ideas from the field are ESSENTIAL!
- Collaboration is key – we can't do this alone, sharing ideas and working together on mutual goals and initiatives is important

Questions?

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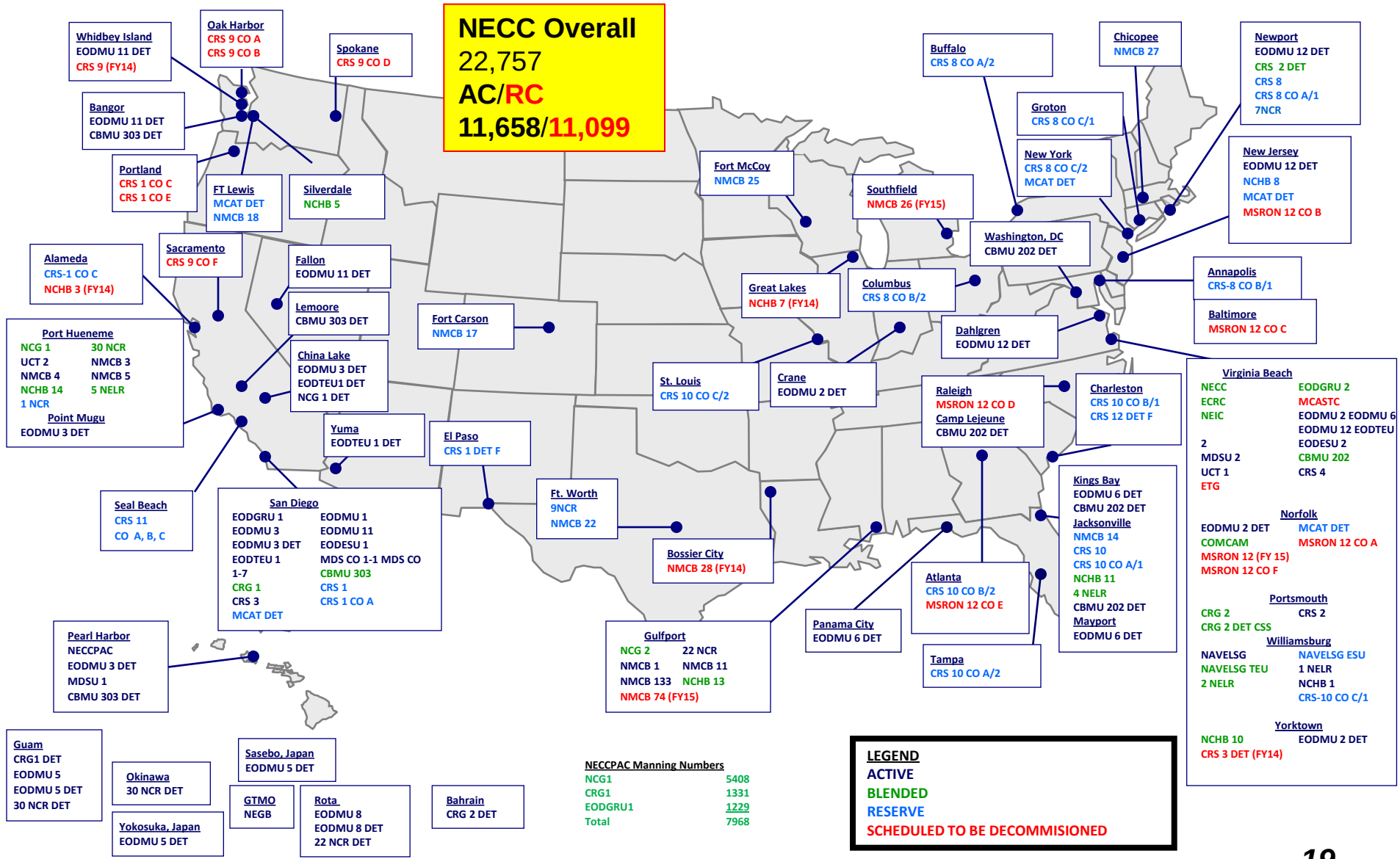
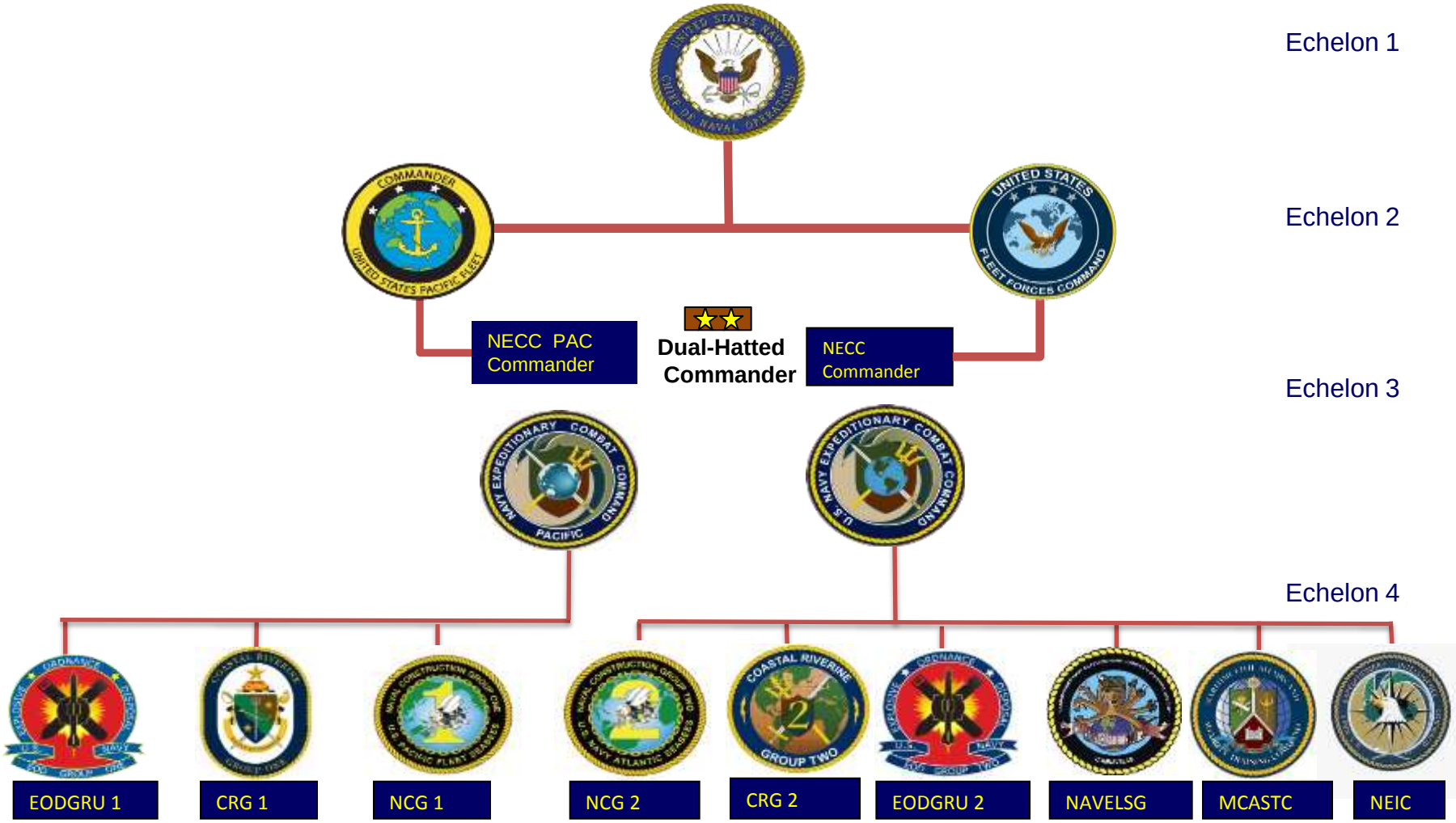
Back-up

NECC/NECCPAC Unit Locations

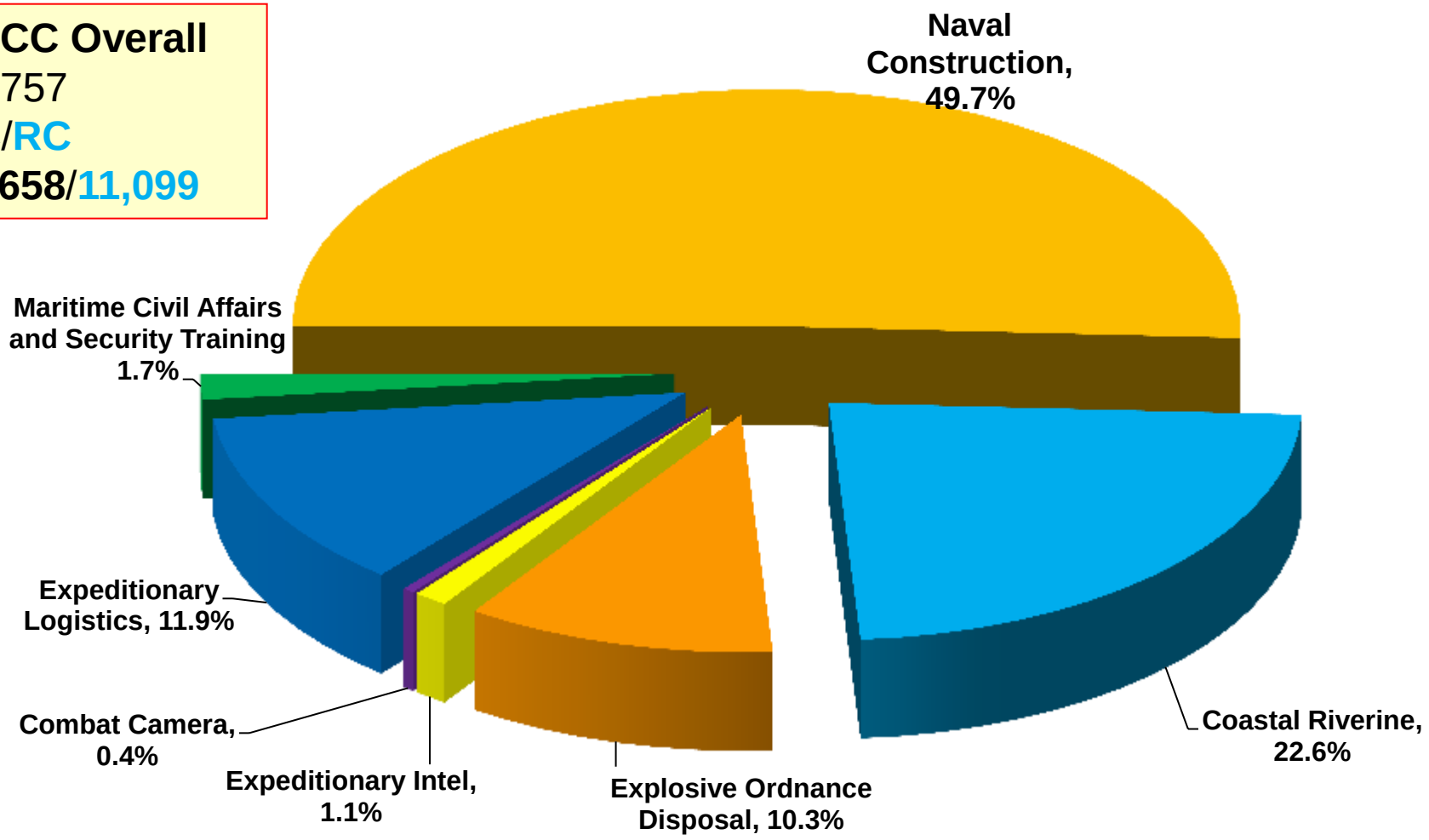


NECC Organization



NECC at a Glance

NECC Overall
22,757
AC/RC
11,658/11,099



Unique Warfighting Capabilities; 49 percent Reserve Sailors

NECC OV-1

Navy Expeditionary Combat Command

Navy Expeditionary Combat Command (NECC) serves as the single functional command for the Navy's expeditionary forces and as central management for the readiness, resources, manning, training and equipping of those forces. Expeditionary forces are organized to accomplish specific objectives in other countries.

NECC is a scalable force spanning the full range of military operations from Major Combat to Theater Security. Made up of dedicated, ready Sailors, NECC forces are high impact, operating around the globe, building partnerships and helping increase partner navies' capability to promote peace and prevent war. However, when called upon, they also become primary enablers for a Combatant Commander to win a crisis or war effort.

Adaptive, Responsive and Expeditionary

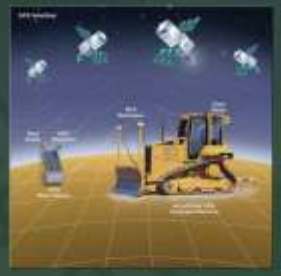
EPIC & GPS Control

Navy Energy Program
Expeditionary Energy

Expeditionary Power Integration and Control (EPIC)

SMART Grid Technology

- Generator output changes with load changes - maximizing generator efficiency
- Communication between load and generator, as demand goes down power gerneration decreases



Construction Equipment GPS Blade Control Modernization

- Improve earth-moving operational efficiency for both manpower requirements and fuel efficiencies
- GPS-assisted dozer reduced total time by as much as 50%, translating to 40% reduction in fuel consumption
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Generators & ECU

Navy Energy Program
Expeditionary Energy

Improvements to Generators

- Replace current generators with solution that has substantially improved fuel economy and reliability at a lower cost
- 20% efficiency improvement
- 20% reduction in operating cost
- Multi-fuel capable (JP-8, JP-4, DF-1, DF-2, DF-A) in extreme climatic and tactical military environments
- EPA certified engines

Improvements to Environmental Control Units

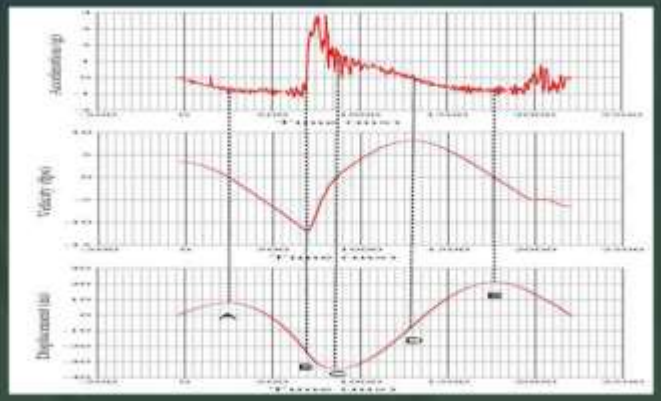
- Decrease fuel required for HVAC by 20-50%
- Equipment rated for expeditionary operating environments
- Fit within the size/weight envelope of current deployed systems
- No increase in required logistics support
- EPA certified engines

Surface Craft

Navy Energy Program
Expeditionary Energy

Surface Craft

Riverine Command Boat Data Acquisition System on boats for metering and monitoring automated fuel consumption and engine performance



Carried out a full power demonstration of a biofuel blend based on 50% algae-based diesel in a Riverine Command Boat

Why Expeditionary Energy?

Cost of Fuel

- As much as 1.4 gallons of fuel can be consumed to deliver 1 gallon of fuel to forces on the battlefield
- Slow down deployment, rate of advance or battlefield maneuverability
- Affect weight, speed, range and lethality of U.S. weapon systems
- If Abrams tanks were 50% more fuel efficient – build up of Operation Desert Shield/Desert Storm could have been completed in 5 months vice 6 months (about 15% more quickly)
- During 2003 U.S. advance on Baghdad, U.S. forces were outpacing their logistics support
- Fully burdened cost of fuel is $40-$400 per gallon

NECE Initiatives for CY2014

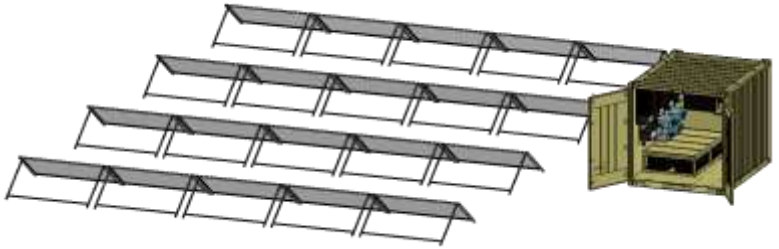
Initiative 3.4: Tactical Energy Security: Continued implementation of the NECC 15 year strategy to meet the Navy's goals to reduce energy.

Lead Org: NECC | Lead Name: John Mark Serré
Secondary Org: NAVFAC | Secondary Lead: CDR Jim West

Action ID	Action	Supporting Org	Est Start Date	Est Comp Date	Status	Reason
3.4.01	Develop expeditionary energy training to enhance materiel/non materiel solution awareness in support of SECNAV/OPNAV energy goals.		1/4/2014	12/1/2014	On Track	On Track
3.4.02	Analyze opportunities to implement behavorial, operational and procedural (non-materiel solutions) changes to meet NECC's long term energy goals. Develop areas of opportunity for subsequent development. ID and implement TTP and CONOPS changes to meet NECC's long term energy goals.		1/1/2014	12/31/2014	On Track	On Track

Expeditionary Power Integration and Control (EPIC)

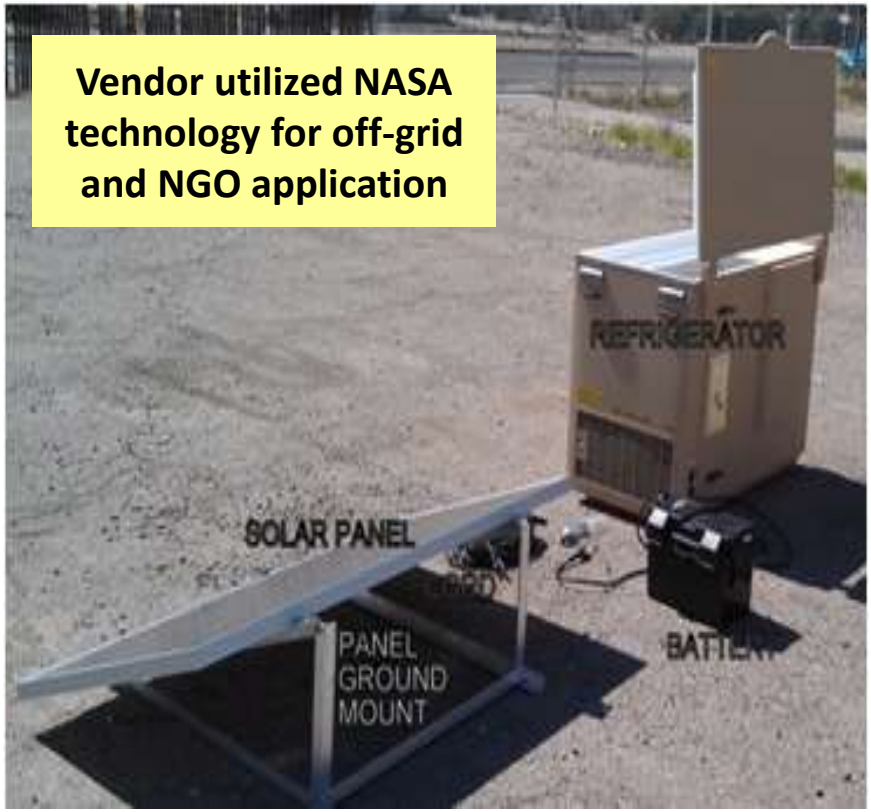
- **On-demand power for Expeditionary Navy**
  - Power generation (Diesel Generator supplemented by Photovoltaic Arrays)
  - Power storage (High density LiFe PO4 batteries)



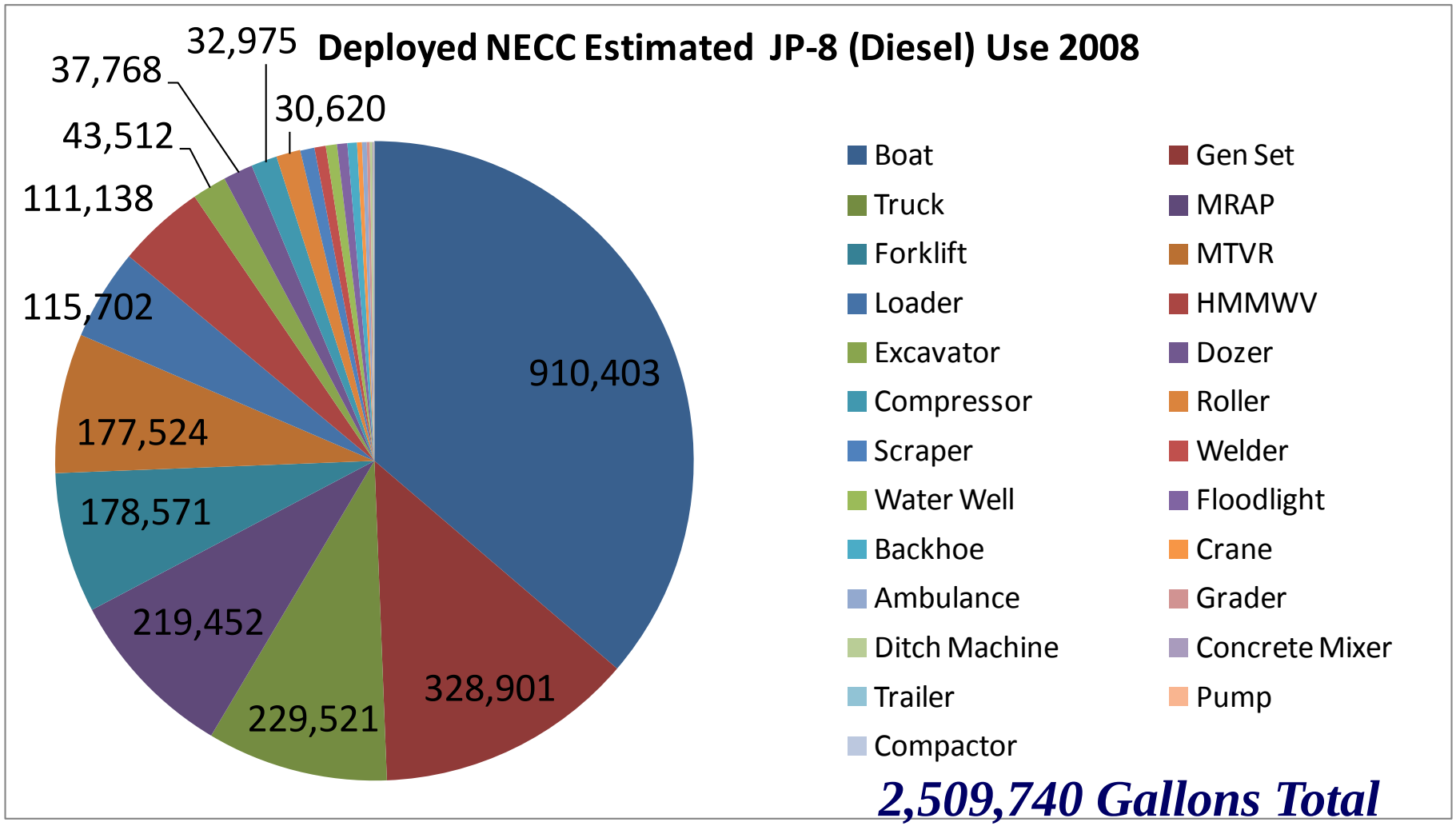
- **Reduces fuel usage by 60%**
- **Power management and priority load shedding**
- **Tactical advantage: Facilitates Silent Operations via "Quiet Times"**

Solar/DC Refrigerator

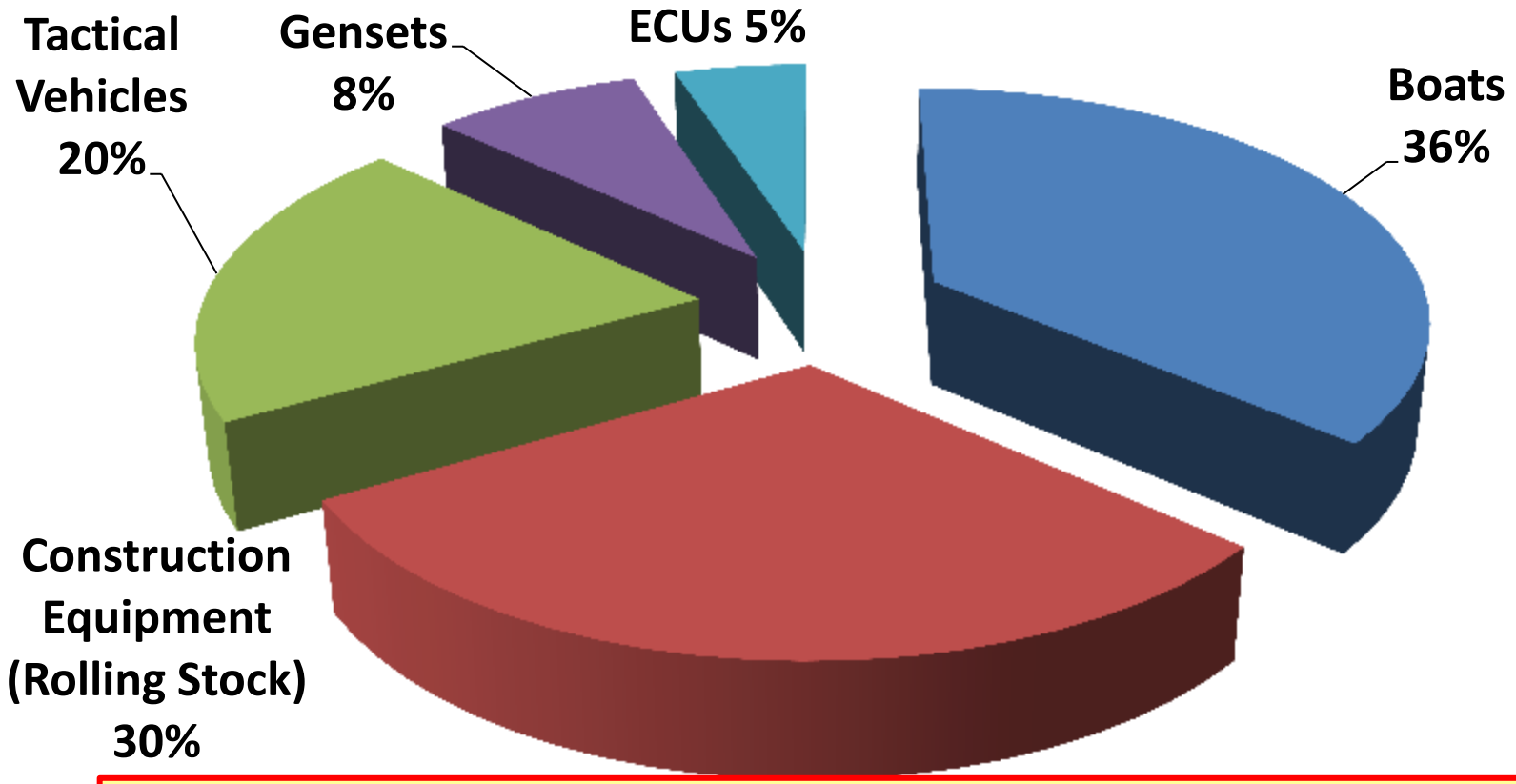
- **Refrigerator powered by solar and/or DC battery**
  - Requires zero fossil fuels
  - Maintains temp at 35-40ºF
  - 7.6 cubic foot capacity
- **Designed for projected operating environment**
- **Provides cold storage for medical supplies, water, and food**
- **Tactical Advantages**
  - Operates independent of “grid”
  - Two man portable and easily transported



2008 Fuel Consumption Baseline (Gallons)



NECC Top Fuel Consumer Categories



Top Consumers Account for 99% of Fuel Use